

C L A I M S

1. A transfer apparatus for a target substrate, comprising:

a rotatable rotary base;

5 first and second arm mechanisms attached to the rotary base and configured to bend and stretch, each of the first and second arm mechanisms comprising a proximal end arm, an intermediate arm, and a pick which are pivotally coupled to each other sequentially from
10 the rotary base, and the picks being disposed to support the target substrate;

a link mechanism coupled to the proximal end arms of the first and second arm mechanisms to drive the first and second arm mechanisms;

15 a first driving source configured to rotatably drive the rotary base; and

a second driving source configured to drive the link mechanism so as to bend or stretch the first and second arm mechanisms.

20 2. The apparatus according to claim 1, wherein the link mechanism interlocks the first and second arm mechanisms, and when one of the first and second arm mechanisms is substantially in an extended state, the remaining one is substantially in a contracted state.

25 3. The apparatus according to claim 2, wherein the link mechanism comprises a driving link which is pivotally driven by the second driving source, and

first and second driven links which respectively couple the driving link to the proximal end arms of the first and second arm mechanisms.

4. The apparatus according to claim 3, wherein a
5 pivot shaft of the driving link is arranged to be coaxial with a rotary shaft of the rotary base.

5. The apparatus according to claim 3, wherein the link mechanism is pivotally coupled to the rotary base, and a pivot shaft of the driving link is arranged
10 at a position shifted from a rotary shaft of the rotary base.

6. The apparatus according to claim 3, wherein the driving link substantially comprises a single link lever.

15 7. The apparatus according to claim 3, wherein the driving link comprises a plurality of link levers that are coupled to each other.

8. The apparatus according to claim 3, wherein the first driven link is axially supported by the driving link on a second arm mechanism side across a
20 center line, and the second driven link is axially supported by the driving link on a first arm mechanism side across the center line, the center line being a perpendicular bisector of a line segment that connects
25 centers of the picks of the first and second arm mechanisms in an initial state where both the first and second arm mechanisms are contracted.

9. The apparatus according to claim 8, wherein the first and second driven links are arranged at different height levels and intersect each other.

10. The apparatus according to claim 1, wherein
5 the second driving source comprises a rotary motor.

11. The apparatus according to claim 1, wherein the second driving source comprises a linear motor.

12. The apparatus according to claim 1, wherein
10 the proximal end arms of the first and second arm mechanisms are rotatably supported on the rotary base about shafts which are spaced apart from each other on one plane.

13. The apparatus according to claim 12, wherein
15 the picks of the first and second arm mechanisms are arranged to face in different directions on one plane, and an open angle of the picks is set within a range of 60° to 180°.

14. The apparatus according to claim 1, wherein
20 the proximal end arms of the first and second arm mechanisms are supported on the rotary base to vertically overlap and be rotatable about one axis as a center.

15. The apparatus according to claim 14, wherein
25 the picks of the first and second arm mechanisms are arranged to vertically overlap and face in one direction.

16. A driving mechanism having a function of

detecting a rotational position, comprising:

hollow pipe inner and outer driving shafts which are coaxial and rotatable;

5 a plurality of driving sources connected to each of the inner and outer driving shafts;

a detection pattern disposed on an inner surface of the outer driving shaft;

10 a light-transmitting window disposed on the inner driving shaft so as to receive reflected light from the detection pattern;

a reflection member configured to reflect the light passing through the light-transmitting window in an axial direction of the inner driving shaft;

15 a light-receiving portion which receives the light reflected by the reflection member; and

a position detector configured to obtain a positional relationship in a rotational direction between the inner and outer driving shafts based on an output from the light-receiving portion.

20 17. The mechanism according to claim 16, further comprising:

a light-emitting portion configured to emit light in the axial direction of the inner driving shaft; and

25 a reflection member configured to reflect the light from the light-emitting portion in a radial direction to irradiate the detection pattern with the reflected light through the light-transmitting window.

18. The mechanism according to claim 16, wherein the light-receiving portion comprises an image sensor configured to detect an image of the detection pattern.

5 19. The mechanism according to claim 18, further comprising an illumination member configured to irradiate the detection pattern with illumination light.

20. The mechanism according to claim 18, wherein the detection pattern comprises an array of different
10 color regions.

21. The mechanism according to claim 18, wherein the detection pattern comprises an array of different figures.

22. The mechanism according to claim 18, wherein
15 the detection pattern comprises an array of regions having different lightness levels.